Time : 3 Hours   Max.Marks : 100

PART - A

(10 x 2 = 20 MARKS)

ANSWER ALL QUESTIONS

1.   What is feedback? What type of feedback is employed in control system?

2.   What are the basic elements used for modeling mechanical translational system?

3.   Name the test signals used in control system.

4.   How the system is classified depending on the value of damping?

5.   What is cutoff rate?

6.   What are frequency domain specifications?

7.   Define BIBO stability.

8.   What is quadrantal symmetry?

9.   What is cancellation compensation?

10. What is the advantage of having a lead compensator in a network?

PART - B

(5 x 16 = 80 MARKS)

ANSWER ALL QUESTIONS

11. (a) i) List the properties of signal flow graph?   (8)

          ii) List the rules of block diagram algebra?   (8)

(OR)

11. (b) Derive the transfer function of armature controlled DC motor?

12. (a) The unity feedback system is characterized by an open loop transfer function $G(s) = k / s\ (s+10)$. Determine the gain K, so that the system will have a damping ratio of 0.5 for this value of K.

          Determine settling time, peak overshoot and time to peak overshoot for a unit step input

(OR)

12. (b) For a system whose $G(s) = 10 / s(s+1)\ (s+2)$, find the steady state error when it is subjected to the input, $r(t) = 1+2t+1.5t^{2\ s}$

13. (a) Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies. $G(s) = 10/s(1+0.4s)(1+0.1s)$

(OR)

13. (b) The open loop transfer function of a unity feedback system is given by $G(s) = 1/s\ (1+s)\ (1+2s)$. Sketch the polar plot and determine the gain margin and phase margin

14. (a) Construct Routh array and determine the stability of the system represented by the characteristic equation $s^5+s^4+2s^3+3s+5=0$. comment on the location of the roots of characteristic equation.

(OR)

14. (b) i) List the rules for constructing root locus   (12)

          ii) Write the procedure for constructing root locus   (4)

15. (a) Check if all the roots of the following characteristic equations lie within the unit
circle
i) $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$ (8)
ii) $z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$ (8)

(OR)

15. (b) Determine the z-transfer function of two cascaded systems each described by
the difference equation $c(k) = 0.5c(k-1) + r(k)$

*****THE END*****